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AUTHOR Gloeckner, Gene W.
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ABSTRACT

Technology education has a long history of attempting to make female students comfortable with the field. Although there has been limited success in recruiting females into the field, the situation is much more positive than it was 75 years ago, when girls were often forbidden to take "manual training" classes. A 1980 Montana report on gender bias in technical education in the state showed less than 10 percent female enrollment in every technical area except graphic arts (where there were 51 percent females). Today, there is still a disparity between males and females in technology education and other technical fields. Among technology teachers, only about 7 percent are female. In most high school subjects the gender differences are striking, with less than 15 percent female enrollment in technology courses. Middle school data, however, show gains in female students in the technical fields. In higher education, more females than males are earning associate's and bachelor's degrees, whereas the reverse is true for doctoral degrees and professional degrees. Far more males than females are earning degrees in the technological fields. Although technology education has come a long way in 75 years, much more progress needs to be made in making technology education acceptable and accessible for girls and women. (Contains 13 references and a gender quiz with answer key.) (KC)

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Gender Facts: A Moral Dilemma

by
Gene W. Gloeckner, Ph.D.
December, 1997

American Vocational Association

Las Vegas, Nevada

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Our profession (technology education) is certainly used to gender issues. We have a long history of attempting to make females comfortable with the subjects we teach in technology education. An example of this can be seen in the following excerpts from a 1912 typed letter to J. H. Francis, Superintendent of Los Angles City schools, from C. A. Kunou a manual training teacher.

> I respectively *beg*... that girls classes be organized in manual training rooms of the city during the regular school time, but particularly after school, in the so-called continuation work....I believe it is practical and beneficial to girls and for the further reason that neither in organic nor moral law is there any reason why they should not be allowed to take this kind of work.... I am fully convinced that this would be a good thing neither radical nor visionary, but perfectly sound in theory and practice.... With your approval we would allow girls- one, two, three, or more at a time to come to the sloyd rooms during the regular school time or as continuation classes.

Superintendent Francis wrote in long hand - "Try it in a limited way in one or two centers."

This request seems ludicrous to us now. However gender opportunities in technical fields and vocational fields were slow to change. In a 1980 State of Montana final report on gender bias in technical education in Montana, there were less than 10% females in every technical area except graphic arts (where there were 51% females). The optimistic (and clearly misguided) PI of the project and the author of this paper, predicted that the gender gap in technical and technology education would end soon (Gloeckner,

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1980). Now, nearly twenty years later, there is still a disparity between males and females in technology education and other technical fields.

As of last spring, only about 7% of almost 4,200 ITEA (International Technology Education Association) members were female. In a random sample from the Industrial Teacher Education Directory (1997-98), published by CTTE (Council for Technology Teacher Education) and NAITTE, (National Association of Industrial Technical Teacher Education) the percentage of females was calculated at 7%. The ITEA, CTEA, and NAITTE all represent adult populations. Clearly there is a gender dilemma at the classroom teacher and university teacher education levels. However, even more alarming is the continuing gender gap at the public school level. A 1994 Virginia study compared female enrollments in a variety of technology courses (Flowers, 1994). Similar to the 1980 Montana study, one high school subject, Communication Technology, had nearly 50 % female enrollment. But in most other high school subjects the gender differences are alarming. There were 33 course titles listed. Analyses of the 32 remaining subjects (removing Communications Technology) indicate a similar pattern than the Montana 1980 study. Of the 32 remaining course titles listed 27 had less than 15% female enrollment and 17 courses had less than 10% female enrollment.

There are major gains being made in the gender equity issue in technology education, especially at the middle school level. The middle school data from Flowers study are more encouraging. Percentages of females in the Commonwealth of Virginia ranged from a low of 11% (Technology Systems) to a high of 45%. Of the eleven middle school courses listed, only two were less than 20% female and four were over 40% female. Of all middle school courses in the Virginia study 34% of the students were

female. Nearly 3,000 more middle school females took technology education courses in 1993-94 than did in 1990-91 in Virginia. Similar gains are being made in our state of Colorado. One reason for the gain in female enrollment is the tendency for school boards to realize the moral dilemma of not giving all students the needed tools for the millenium. Many districts have invested in modern technology laboratories and/or require at least one technology course at the middle school level.

We know as educators and parents that college requirements and trends impact decision making at the local school level. Therefore, if we are to communicate effectively with administrators, parents and fellow teachers, it is essential to have a realistic understanding of the university world.

A LOOK AT HIGHER EDUCATION

The Almanac Issue of this fall's Chronicle of Higher Education provides a variety of data which gives us a clearer understanding of higher education and related gender issues. Over one quarter of our adult population holds a post secondary degree (6.2% associates, 13.1% bachelor's, and 7.2% graduate or professional degrees). An additional 18.7 % have taken college courses, but do not have a degree. Thus 45.2% of our nation has at least taken formal post secondary training.

The state of Colorado has one of the highest educational levels in the country. Thus the educational attainment numbers are even higher. Over a third of Colorado residence have a post secondary degree (6.9% associates, 18% bachelor's, and 9% graduate or professional) and an additional 24% of Colorado residence have some college, but no degree. Therefore nearly 60% (57.9) of Colorado residence have participated in formal education past high school.

GENDER IN HIGHER EDUCATION

More women are succeeding in college than men. According to the latest available data reported in this fall's Chronicle of Higher Education *, 218,352 men obtain associate degrees while 321,339 women obtained the same degree. This difference continues at the bachelor's degree level (526,131 men and 634,003 women) and the trend further continues at the master's degree level (178,598 men and 219,031 women). However, this trend reverses at the highest paid educational levels. At the doctorate level men accounted for 26,916 and women 17,530. At the professional level men accounted for 44,853 degrees and women 30,947 degrees.

HIGHER EDUCATION PROJECTIONS

Projections of both college enrollment and degrees conferred from 1997 through 2007 continue this general trend. Women will continue to earn more bachelor's, associates, and master's degrees, but fewer doctorate and professional degrees and in fact, the percentage of women who earn degrees will continue to grow over men at the associates and bachelor's degree levels. The master's will stay about the same and the gap will narrow at both the doctorate and professional levels.

WHERE ARE THE LARGE COLLEGE GENDER DIFFERENCES

Table 1 shows some selected major gender subject area differences at the associates and bachelor's degree levels.

Table 1. Gender Differences for Selected Associates and Bachelor's Degrees

	Associates Degree		*Bachelor's Degree*	
Field of Study	**Men**	**Women**	**Men**	**Women**
Health Professions	16,530	81,944	14,443	65,412
Computer and Information Sciences	4,743	4,409	17,463	6,941

Engineering	1,931	301	51,646	10,696
Physical Science	1,424	1,032	12,497	6,680
Psychology	446	1,154	19,548	52,535
Foreign Languages and Literatures	177	439	4,243	9,532
Engineering Related Technologies	30,820	3,912	14,287	1,525

MORAL DILEMMA

These alarming gender differences raise moral questions. As John Goodlad (Goodlad, 1994) has so poignantly discusses in his writings, a democratic society has an obligation to insure that all youth have opportunities to succeed and fail in a wide variety of subjects and methods. Table One begs a series of questions: Shouldn't men become more active in fields such as health professions, psychology, education, and foreign languages? Don't men have a different perspective and experience base which would help these professions grow in a new and different way? Shouldn't women become more active in engineering, physical sciences, and computer related fields? Wouldn't women bring new perspectives and experiences which would help these fields mature? Can we as a democratic society defend such huge gender differences in such a wide variety of career paths? Do our children really have the opportunity to become whatever they want?

RECENT QUALITATIVE STUDIES

Two separate studies at Colorado State University pose several frustrating issues and offer potential solutions to the moral dilemma. Knowlton (1996), used focus groups of middle and high school students taking technology education. Each focus group had an equal number of males and females. Data collected for this study was troublesome to the

Knowlton and her adviser. Some junior high and middle school girls didn't think they needed technical information and believed their future husbands would take care of them. Females saw little value in courses which did not prepare them to raise a family. Females saw only a minor connection between technology classes and their future adult roles. They saw more value in courses such as "home economics", even though the district where the students were from had changed "home economics" to "consumer and family studies" years ago. There was concern about working mothers - one stated; "I don't want to be like my mother and work all day and then come home and work all night" (Gloeckner, & Knowlton, 1996, p. 7). As a single mother and community college CAD instructor, Knowlton was so devastated by the results that she wanted to abandon the study.

Knowlton (1996), asked students ways to make technology education more appealing to girls. Responses included but were not limited to:

- Educate the counselors about what technology education is and help them understand it is OK for girls to take classes their.
- Educate the counselors that technology education should not be a place for "goof-offs". It's a real class with academic content.
- Remove the "rough" looking laboratories sometimes with stacks of equipment that gives almost a junk yard appearance.
- If possible, place classes nearer to the academic classes.
- Exhibit student's work so more students know that technology education is not a traditional "shop" class.

Johnson reviewed several years worth of studies by Silverman and Pritchard (1993, 1993, 1995) in an attempt to design a technology class which would be effective for middle school girls. Johnson, (1998) designed an all girl class with a female teacher. He also redesigned the curriculum to focus on design elements, included field trips and visits to local technology high school laboratories, attempted to make the appearance of the classroom less "old fashion". Based on the Silverman and Pritchard studies, he shortened the length of the course, added female role models from industry, and added a career connections section.

His data were collected through a variety of means which included: personal interviews, notebook analysis, and questionnaires. He was also a participant observer (classroom helper) for the class.

Most girls did not find the female classroom teacher more appealing than a male. Most girls did not find the all girl class more appealing. The career connections were seen as boring, except for field trips of visiting industry females who used "hands-on" activities for their presentations.

Johnson (1998) found the following were effective from a girl's middle school perspective:

- Visits to local high school technology classes were very effective.
- Over half of the girls enrolled in the class because it was nine weeks long instead of 18 weeks. This was seen as especially important due to the girls desire to take other elective classes (band, choir, business, etc.).

- Document analysis revealed that the girls enjoyed the design stations more than those which did not have a design element.
- The girls also liked the clean updated appearance of the Lab 2000.

CONCLUSION

The technology and technical education profession is not unique in its struggle against gender stereotypes which start at birth and are quickly amplified. Societal norms are difficult to change. It wasn't long ago that a male nurse or a female industrial arts teacher was a rarity. Today, both are not only accepted but praised for their tenacity and willingness to stand against societal norms. There are not easy solutions to these complex problems. Problems which are so mired in our societal setting will take generations to solve. It is clear however, that we have come a long way since the 1912 begging request of Charles Kunou to let one, two, or even three girls into the 1912 technical world of manual training. It is also clear that much work is ahead of us if we truly want to give boys and girls equal opportunities in our educational system.

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Gender Quiz

by Gene W. Gloeckner, Ph.D.

1997

The purpose of this quiz is to test your basic knowledge about gender differences at the post secondary education level. Circle the answer you think is correct.

1. Which gender earns the most associate degrees? Male Female

2. Which gender earns the most bachelor's degrees? Male Female

3. Which gender earns the most master's degrees? Male Female

4. Which gender earns the most Ph.D.s? Male Female

5. Which gender earns the most professional degrees? (such as law, veterinary, medicine, dentistry, etc.) Male Female

6. Which gender has more degrees in health professions? Male Female

7. Which gender has more degrees in engineering? Male Female

8. What percentage of females took printing classes in the 1980s?_____

9. What percentage of females took automotive in the 1980s?_____

10. What percentage of females took communications technology in the mid 1990s?

11. What percentage of females took manufacturing technology in the mid 1990s? __

12. In the health professions, what are the percentages of males and females earning
    Associates Degrees? male_____ female _____
    Bachelor's Degrees? male _____ female _____

13. In computer and information sciences, what are the percentages of males and females earning
    Associates Degrees? male _____ female _____
    Bachelor's Degrees? male _____ female _____

14. In engineering, what are the percentages of males and females earning
    Associates Degrees? male _____ female _____
    Bachelor's Degrees? male _____ female _____

15. In the physical sciences, what are the percentages of males and females earning

Associates Degrees? male _____ female _____

Bachelor's Degrees? male _____ female _____

16. In psychology, what are the percentages of males and females earning

Associates Degrees? male _____ female _____

Bachelor's Degrees? male _____ female _____

17. In the foreign languages and literatures, what are the percentages of males and females earning

Associates Degrees? male _____ female _____

Bachelor's Degrees? male _____ female _____

18. In engineering related technologies, what are the percentages of males and females earning

Associates Degrees? male _____ female _____

Bachelor's Degrees? male _____ female _____

19. What percentage of the U.S. adult population holds a post secondary degree?

Associates Degrees? _____

Bachelor's Degrees? _____

Graduate or Professional Degrees? _____

20. What percentage of the Colorado adult population holds a post secondary degree?

Associates Degrees? _____

Bachelor's Degrees? _____

Graduate or Professional Degrees? _____

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The purpose of this quiz is to test your basic knowledge about gender differences at the post secondary education level. Circle the answer you think is correct.

1. Which gender earns the most associate degrees? Male ***Female***

2. Which gender earns the most bachelor's degrees? Male ***Female***

3. Which gender earns the most master's degrees? Male ***Female***

4. Which gender earns the most Ph.D.s? ***Male*** Female

5. Which gender earns the most professional degrees? (such as law, veterinary, medicine, dentistry, etc.) ***Male*** Female

6. Which gender has more degrees in health professions? Male ***Female***

7. Which gender has more degrees in engineering? ***Male*** Female

8. What percentage of females took printing classes in the 1980s? ***50%***

9. What percentage of females took automotive in the 1980s? ***<10***

10. What percentage of females took communications technology in the mid 1990s? ***50%***

11. What percentage of females took manufacturing technology in the mid 1990s? ***<10***

12. In the Health Professions, what are the percentages of males and females earning
    Associates Degrees? male ***17%*** female ***83%***
    Bachelor's Degrees? male ***18%*** female ***82%***

13. In Computer and Information Sciences, what are the percentages of males and females earning
    Associates Degrees? male ***52%*** female ***48%***
    Bachelor's Degrees? male ***72%*** female ***28%***

14. In Engineering, what are the percentages of males and females earning
    Associates Degrees? male *87%* female *13%*
    Bachelor's Degrees? male *83%* female *17%*

15. In the Physical Sciences, what are the percentages of males and females earning
    Associates Degrees? male *58%* female *42%*
    Bachelor's Degrees? male *65%* female *35%*

16. In Psychology, what are the percentages of males and females earning
    Associates Degrees? male *28%* female *72%*
    Bachelor's Degrees? male *27%* female *73%*

17. In the Foreign Languages and Literatures, what are the percentages of males and females earning
    Associates Degrees? male *29%* female *71%*
    Bachelor's Degrees? male *31%* female *69%*

18. In Engineering Related Technologies, what are the percentages of males and females earning
    Associates Degrees? male *89%* female *11%*
    Bachelor's Degrees? male *90%* female *10%*

19. What percentage of the U.S. adult population holds a post secondary degree? *26.5%*
    Associates Degrees? *6.2%*
    Bachelor's Degrees? *13.1%*
    Graduate or Professional Degrees? *7.2%*

20. What percentage of the Colorado adult population holds a post secondary degree? *33.9%*
    Associates Degrees? *6.9%*
    Bachelor's Degrees? *18%*
    Graduate or Professional Degrees? *9%*